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GENETIC ASPECTS OF FERTILITY AND INFERTILITY IN CATTLE*

BY

GILBERT B. YOUNG,

ANIMAL BREEDING RESEARCH ORGANISATION, EDINBURGH

PROBLEMS OF MEASUREMENT

One of the first things that is noticed on reading the published work on the inheritance of fertility and sterility is the difficulty the authors have in obtaining a measure of fertility which can be used in calculations to estimate its inheritance. This difficulty is not so great when specific genes are involved, but is marked when subfertility is under study. The most common measure used is probably the conception rate in various forms. This is partially satisfactory, but it does not take into account those cows which fail to show oestrus regularly. It may exclude barren heifers if the figures are arrived at from calvings. If the figures include animals which do not hold to the bull, the figures may be biased because some animals may be disposed of as sterile after three or four calvings, while more valuable animals may be persisted with.

Calving intervals are also used as a measure of fertility, but they, too, only include animals which have calved, and may be biased by a deliberate extension of their intervals to obtain maximum production from persistent milkers. Completely sterile animals may be studied separately, but this of course excludes the large subfertile groups.

Because of this difficulty of measuring fertility, the majority of studies on infertility are not comprehensive. Many investigations, using certain indexes of measurement, show that genetic factors are unimportant, but practically all of these can be challenged on the ground of bias in the material. Similarly, many investigations show that genetic factors can be quite important, but these also may be criticised on the ground that they are dealing only with one particular breed or herd, and one particular character.

Great care therefore should be taken to avoid generalisations based on one or two studies only.

THE INHERITANCE OF NORMAL FERTILITY AND SUBFERTILITY

This may be regarded from various points of view: transmission from bulls to their daughters, from dams to their daughters, from bulls to bulls, and from dams to bulls. Only the first two of these have been studied.

Differential Fertility of the Daughters of Different Bulls.—Kab (1937) found that the fertility of the daughters of 22 bulls in the Yellow Franconian breed of dairy cows differed considerably. Similar results were obtained by Löwe (1938). Trimberger & Davies (1945) studied the average rate of conception of the daughters of nine different A.I. bulls which had been used in the Nebraska dairy herd. The number of daughters varied from 5 to 20. The average conception rate of these daughters varied considerably with a range from 1·17 to 2·25. There were 23 sterile females in 204 daughters, but none of the sires apparently had more than would be expected by chance. The requirement of 2·25 services per conception for the daughters of one sire was highly significant, and the authors considered that in all probability this sire transmitted this characteristic to his daughters.

These three studies, therefore, would seem to indicate that bulls can differ in the fertility of their daughters. Two subsequent studies, however, indicate that compared to the total variation in fertility this effect is not great.

Korkman (1947) investigated conception rates from 13,119 calvings of 4,009 Ayrshires in 38 herds in Finland. Only about 1 per cent. of the total variation in conception rates was due to genetic differences arising from the sires of the cows. A similar analysis was done of those cows which were discarded because of sterility. Here the amount of variance due to sires of cows was about 2½ per cent. Dunbar & Henderson (1950) investigated the records of the breeding performance of artificially sired cows. Two measures of fertility, non-returns to first service and calving intervals, were employed. Estimates were obtained of the components of variance due to additive genetic differences among sires. Sire variance was essentially zero in both studies. Therefore, heritability of fertility was estimated to be near zero.

Some inbreeding studies, however, tend to show that sires' daughters do differ in their fertility. These studies, together with those in which bulls are reported to transmit definite lesions of the reproductive tract to daughters, will be considered later.

Considering all of these studies on subfertility together, it seems that although evidence has been produced that bulls can differ in respect of their daughters' fertility, the effect is very slight compared with the variations in fertility due to environmental circumstances.

The Inheritance of Fertility from Female to Female.—Let us now look at the problem from the female side. To what extent is one cow a regular breeder, producing a calf each year, while another is a repeat-breeder always difficult to get in calf? To what extent are those differences, if they exist, genetic?

Let us consider the answers given by different workers to the first question, that of repeatability of breeding ability. Berge (1942) found an intra-cow correlation of 0·2 for the number of services per pregnancy. Lasley & Bogart (1943) found that 80 range cows with a high conception rate and high calf crop repeated this performance the following year, whereas 40 cows with a bad performance repeated badly also. Trimberger & Davies (1945), however, found the opposite. The repeatability of services per conception for 133 virgin heifers and 199 cows was practically nil. Korkman (1947) in the study of 4,009 Ayrshires mentioned earlier, found that the fraction of the total variance in conception rates due to permanent differences between cows was only about 5 per cent. In an extensive survey (Olds & Seath, 1950) data were obtained from 6,509 cows. Estimates of breeding efficiency were based on "non-returns," all cows having at least four months in which to return for another service. As the number of services required the first year increased, there was a rather uniform

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increase in the average number of services per conception required the second year. However, the differences were not great, the increase being approximately 0·1 service for each service increase of 1·0 for the first year. Nearly 55 per cent. of the cows required the same number of services in both years. The correlation for breeding efficiency in consecutive years was about 0·08. Casida (1950) reports that in an investigation of two herds in which artificial insemination was used, only 14 per cent. and 18 per cent. of the variation in breeding was found to be permanent. He noted, moreover, from a study of the records of an A.I. centre, that if the repeat breeders had been culled the first year, repeat breeders in the second year would have been reduced by only 8 per cent. Asdell (1952) records that repeatability of non-returns to first service in A.I. centres is only 0·027, and that that of services per conception, and of days from first service to conception, is about 0·12.

The conclusions which emerge from the most extensive of these studies seem quite clear and may be summed up in Casida's (1950) words—" The condition of repeat breeding seems not to be highly permanent. A cow which is a repeat breeder for one pregnancy, is not very much more likely to be the same at her next one. There is, however, a slight tendency to repeat the breeding performance from one service period to the next."

An answer may now be sought to our second question. To what extent are these permanent differences genetic? Two methods of approach to this question have been adopted.

(*a*) Cow families. Several workers have investigated the degree to which cow families are differentiated from each other. Kab (1937) in his study of 1,475 cows found that through several generations, 35 families showed high fertility, and 11 families low fertility. Spielman & Jones (1939) reported considerable differences in reproductive efficiency as measured by an index based on calving intervals in cow families in the Oregon State College Herd. Seath, Staples & Neasham (1943), studying conception rates in the Lousiana State College Herd, made similar observations as also did Trimberger & Davies (1945) in the Nebraska Dairy Herd. Taussig (1946) came to similar conclusions. Chance & Mather (1949), however, studied Dairy Herd Improvement records on cows on six herds, and found that reproductive efficiency differed significantly among females in only one family out of 89 studied. They concluded that under systems of breeding common in most herds, families, formed by all cows descending in the direct female line from the foundation cows, are not sufficiently differentiated to receive much consideration in selection. Similar conclusions were reached by Tabler, Tyler & Heath (1951), who investigated the breeding records of 19 cow families in a herd of Ayrshires. They found differences in fertility, but these were not large enough to be statistically significant. The average coefficient of relationship was only 15 per cent. between members of the same family. This low figure probably accounted for the small amount of variance between families.

The conclusions, then, from the study of cow families are contradictory. The method, however, as Tabler, Tyler & Heath (1951) point out, is not a good one for proving whether fertility is inherited or not, since cows in cow families are not as a rule closely related.

(*b*) Daughter-dam comparisons. A better method of studying the inheritance of fertility is by daughter-dam comparisons. Fohrman & Graves (1939) found that nine dams with high conception rates had similar daughters, whereas seven dams with low rates had also poor daughters. Trimberger & Davies (1945), however, in much more extensive material, found that it was not possible to predict the conception rates of daughters from their mothers. Olds, Morrison & Seath (1949) came to similar conclusions. Casida (1950) states that daughter-dam comparisons indicate that the heritability of the repeat breeding condition is about 8 to 11 per cent. Asdell (1952) estimates heritability of non-returns to first service at 0·004, and of services per conception and of days from first service to conception at 0·07.

From a consideration of these daughter-dam comparisons, therefore, it would appear that the heritability of conception rate is not high, and is probably under 10 per cent. If we accept Casida's figures, that the permanent difference between cows in repeat breeding amounts to about 14 to 18 per cent. of the total variation, we could assume that about half of this is genetic.

Variation in Conception Rate Attributable to Bulls.—Bulls, apart from those which are sterile or near sterile, differ considerably in their fertility (Milk Marketing Board, 1950a). There is little information, however, on the extent to which these differences are genetic, and capable of being transmitted from bull to bull, or the extent to which dams differ in their ability to produce high conception or low conception rate sons.

The Board (1950b) reports that Hereford and Aberdeen Angus bulls have given the best results and the Friesian and Shorthorn about identical. Hignett (1950) states that the inspection of records of cattle breeding centres shows quite commonly that the semen of the same bull over a period of months can effect a conception rate of 90 per cent. in some herds, whereas, in others, the figure may be even less than 20 per cent. Obviously, the conception rate of a bull is very dependent on environment. It is probable, therefore, that the variation within bulls is much greater than between bulls, and of the permanent differences between bulls probably only part is hereditary.

Herd Differences in Fertility.—In all discussions on quantitative inheritance in cattle, the factor of herd differences must be taken into account. It might be thought that herds differed greatly from each other genetically, and that this caused the differences in herd fertility levels which have been noticed. There is little evidence that this is so. Trimberger & Davies (1945) state that records in certified breeding associations showed that a herd may have a good record one year and a poor one the next. Olds & Seath (1950) came to similar conclusions. Of 172 herds which averaged more than two services per cow in the first year, only 16 were still as low the next year, but the number of problem herds remained about the same both years —*i.e.*, 6¼ per cent. Since the genetic structure of the herds does not change rapidly in one year, it is clear that most of the herd differences in fertility are due to environmental rather than genetic causes. No corresponding British figures have been found, but since breed structure is such that commercial herds are only two or three generations removed from the pedigree herds, there can be little doubt that the situation is similar in this country.

Genetic Methods of Improving Fertility.—From the studies we have described, it would appear that at least 80 per cent. of the variation in normal fertility in dairy cows can be attributed to environmental causes, and of the remaining 20 per cent., about half would appear to be due to additive genetic effects. This means, as Dunbar & Henderson (1950) and Asdell (1952) have pointed out, that selection for fertility cannot be very effective. Moreover, there is of course the automatic natural selection against infertility.

It is possible, however, that epistatic effects are responsible for a considerable portion of the permanent differences between cows. If this were the case, the best genetic method of achieving fertility would not be selection, but crossing. It is possible also, as suggested by Hignett (1950), that genotype environment interactions may be important in fertility. If this is so, to obtain maximum fertility, breeds adapted to particular environments would be required. In either event, however, environmental effects would still make progress in achieving genetic fertility very slow.

It seems, therefore, that very little attention need be paid to selective breeding as a means of raising fertility.

Single Gene Effects: Defects of the Reproductive Tracts

Hypoplasia.—The most extensive study of a single gene effect causing sterility in cattle is that of genital hypoplasia in Swedish Highland cattle. This has been described by Lagerlöf (1934, 1938, 1939), Eriksson (1943), Lagerlöf & Settergren (1952) and Lagerlöf & Boyd (1952).

References may be made to these papers for a clinical description of the condition. The hypoplasia is caused by a recessive, autosomal gene with incomplete penetrance (about 0·5 as an average for the two sexes).

The origin can be traced back to about 1900 when two bulls in Jamtland were known to be affected, and through the extensive breeding use of these bulls and their offspring, the condition was spread widely in breeding herds. Eriksson considers that the first increase probably took place, firstly, owing to the effect of chance within the small herds; later selection in favour of the hypoplasts would make itself felt since affected females show a relatively high butter-fat percentage. The counter selection due to the sterility of double-sided hypoplastic animals was not able to compensate for the selection in favour of one-sided hypoplastic bulls. In 1935, 686 animals in breeding herds were investigated and 23 per cent. were manifest hypoplasts, and 17 per cent. doubtful ones. The State and the Breed Societies from 1937 onwards took measures to cull affected animals. The frequency of manifest hypoplasts fell from 25 per cent. in the 1935 material to 8 per cent. in the 1942 material. There were then only 1 per cent. double hypoplasts. Eriksson (1943) calculated that to reduce the hypoplasia frequency from the 1943 value of 8 to 4½ per cent. would take about 15 years, and to reduce it to ½ per cent. would take about a century.

In the 1935-52 report of the clinical material, which consisted of 8,145 animals in about 450 herds, evidence is produced that the frequency of the condition is still declining, but at a much slower rate.

Jersey and Holstein Female Sterility.—Some interesting observations on the cause of sterility in heifers have been made by the workers studying inbreeding in the University of California herd. This experiment involved two breeds, Jersey and Holstein. A large percentage of the bulls and cows selected at random so far as recessive genes were concerned and more or less unrelated to each other, were found, when tested, to be carrying what were probably autosomal recessive genes for female sterility (Gregory, Mead & Regan, 1945; Mead, Gregory & Regan, 1946). These workers regarded as fertile any cows that gave birth to a calf following a normal gestation, and as infertile any female, free from infectious disease, which failed to produce a calf after repeated services to one or more fertile bulls. The sterile Jerseys exhibited normal heat, but the Holsteins showed abnormal oestrous cycles and usually complete absence of heat. The condition was found in females only. The two types of sterility were thought to be due to different autosomal genes.

In a further study, Mead *et al.* (1946) estimated the gene frequency of the Jersey type of female sterility to be 0·333 and of the Holstein type to be 0·083 in their material. They also estimated the frequency of sterile heifers generally, based on their value of the gene frequency. When both genes are segregating together in a population mating at random, the proportion of sterility should be one sterile heifer in nine. These estimates were checked against the incidence of sterility as reported in the literature and found to fit fairly closely. They summarise by saying that "according to the available data, sterility in dairy heifers is common. Our data indicate that most of it, if not all, is caused by heredity. Possibly environmental factors may be responsible for the failure in some heifers to conceive. Such cases, however, are probably rare under a good regime of feeding and management, when there are no infectious diseases."

In a subsequent paper, Gregory, Mead, Regan & Rollins (1951) reported the results of additional mating tests, which they consider support the earlier conclusions. The condition seems to be due to zygote abortion in the late cleavage or early blastocyst stage.

These results are of very great interest, but before accepting that the sterility is due to single autosomal recessive genes, confirmation by other workers would be desirable.

Nymphomania.—Nymphomaniac cows are common in some herds. Casida & Chapman (1951) found that cystic ovaries occurred in 18·8 per cent. of the cows, and in 7 per cent. of animals in a service period in one herd. They consider that the incidence in other herds at comparable production level is similar. Garm (1949) had previously produced figures indicating that inheritance was an important causal factor in nymphomania. Casida & Chapman confirmed this by estimating that the heritability of the occurrence of cystic ovaries some time during life was 0·43 per cent.

Eriksson (1943) showed that cows with cystic ovaries have a larger milk volume, but possibly a lower fat content than normal. He considered, however, that there was no genetic correlation between milk volume and cystic ovaries, but assumed that the connection was of a physiological hormonal nature. Garm (1949) provided further evidence which tended to support these conclusions about yield, but Casida & Chapman (1951) found no evidence of an association with total fat or fat percentage. If the cystic condition of ovaries is indeed highly heritable, bulls for breeding should not be kept from affected cows.

Sperm Defects.—Several sperm defects with a genetic basis are known. Blake (1945) reported that an abundance of spermatozoa with returned tails was probably hereditary in one family which exhibited much sterility. Similarly, he considered that spermatozoa with narrow heads were hereditary in another family. Hancock (1949) reported on Holstein bulls which had a high proportion of spermatozoa showing a head defect. A similar condition had previously been reported in Holland and Denmark. Donald & Hancock (1952) produce evidence that the condition is due to an autosomal sex limited recessive gene. Hancock & Rollinson (1949) record the identification of a sperm defect which they believe is indicative of the existence of a specific type of male sterility in the Guernsey breed. Gregory, Mead, Regan & Rollins (1951) also reported on a genetic form of infertility. The semen had a low concentration of spermatozoa, many of which were malformed.

A pedigree analysis suggested a recessive, but this is probably not the same gene as in the females.

White Heifer Disease.—In Britain, one of the best known genetic defects of the reproductive system is white heifer disease. The condition usually occurs in white animals of the Shorthorn breed, but also in other colours and breeds. The clinical and pathological picture has been very clearly described by Spriggs (1946), who considered that the condition may be due to a sex limited recessive. Hutt (1946) considers that there is linkage between the recessive gene responsible for this condition and the gene for white.

Rendel (1952) reports from a study of the daughters of 10 bulls in a large herd of Shorthorns that the cause of the disease could not be conclusively obtained. It was clear, however, that the chance of a heifer having the disease was increased very considerably by the presence of a white gene.

Other Conditions.—Other conditions in which there is a disturbance of the reproductive tract with a hereditary basis include disturbed sexual cycles (Wagner, 1932), gonadless (Fincher, 1946), *impotentia coenundi* (De Groot & Numons, 1946), intersexuality (Yapp, 1947), *aplasia segmantalis ductus Wolffi* (Blom & Christensen, 1951), and malformed genitalia (Engelhardt, 1952). For a more extensive review of defects of the genitalia, Kobozieff, Pomriaskinsky, Kobozieff & Dupont (1945) and Gilmore (1949) should be consulted. Further information may also be obtained in the review, similar in scope to the present one, by Bane (1952).

Spread of Genetic Defects.—Since sterile animals cannot have offspring, these conditions tend, on the whole, to have a low incidence. It is only when they become associated with good qualities in famous animals, as happened in the Swedish hypoplasia example, that an increase in their frequency is likely.

The Inheritance of the Quantitative Functions of the Sex Glands and of Sexual Behaviour

Semen.—There are significant differences between bulls in concentration of sperm, total number of sperm, initial motility, volume of ejaculate, *p*H, decrease of *p*H on incubation, survival period, and percentage of abnormal spermatozoa (Anderson, 1945, for references), but the extent to which these are genetic has been little investigated. Some work has, however, been done. Blake (1945) reported that there is a fairly constant difference in the shape of the Friesian or Shorthorn sperm head on the one hand, and the Jersey sperm head on the other. It was also thought that Herefords might usually be differentiated from Jerseys by a slightly wider sperm head. Hansson & Bane (1950) investigated semen production in six pairs of one-egg bull twins fed on different planes of nutrition up to 18 months of age. When calculated for bulls on the same feeding level, the variation in the number of sperm per ejaculate (mostly due to heredity) is about 12 times that calculated for the members of the pairs (due to feeding intensities). Thus they conclude that the sperm-producing capacity of bulls seems to be determined mainly by heredity. Olson & Peterson (1951) report that in one set of identical triplet bulls no real differences were found between the bulls in volume, density, total sperm per ejaculate, motility, methylene blue reduction time and abnormal sperm. Generally this field of research would seem to be worth more attention than it has received in the past. Meanwhile, until more is known about identical twins, the conclusion that all of their similarities in semen production are due to genetic factors should be accepted with reserve.

The inheritance of scrotal conformation in relation to heat absorption has also been studied. Bonsma (1940) records that in a hot climate thin scrotal skin and an ability to retract the testicle close to a cool body ensure the fertility of Afrikaaner cattle. Gilmore (1949) gives references indicating that in bison × domestic cattle, yak × domestic cattle and in yak × zebu crosses, the males are often sterile. This is thought to be due to the inheritance of large testicles from one parent and the small scrotal size from the other. It is possible, however, that chromosomal incompatibilities are responsible for the sterility in some of these cases.

Sex Behaviour in the Male.—The question of the degree of sex drive is of much importance in running an A.I. centre. Smith (1951) points out that bulls with slow reaction time tend to be used less than their quicker brethren. To what extent is variation in sex drive genetic? Walton (1950) states that the complex integrated structure of male sex behaviour is genetic in origin, but none the less can be modified considerably by environmental factors. Smith (1951) observed breed differences in reaction time. He places Friesians at the top and Herefords and North Devons well and truly at the bottom. He thinks, however, that the latter are probably there due to confinement after range conditions. He ventures to suggest, however, that the Hereford breed is genetically slow. Lagerlöf (1951) reports that inability to copulate is common in both the Swedish Highland and the Swedish Red Cattle breed, and considers that such difficulties could be avoided by cautioning breeders firmly against eliminating the secondary sexual characters in bulls. Elimination of these in some cases, he thinks, has led to good-natured feminine type bulls, with poor ability to serve, but that their weaknesses are chiefly shown up in poor environments. Hansson & Bane (1950) working with twins, consider that hereditary factors seem to play a decisive roll as regards sexual drive. Olson & Peterson (1951) reported that their monozygotic triplets were all slow at service.

In New Zealand in over five years' work involving 10 to 15 sets of twins per annum, results show that the sex performance of a bull is extremely hard to influence by environmental control so that it would appear that this character of the male is determined mainly by heredity (McMeekan, 1952). It is possible, however, that before we can come to reliable conclusions on the inheritance of sex drive, more data, adequately analysed, are required.

Sex Behaviour in the Female.—The amount of variation in and the genetic determination of heat intervals is probably not of great economic importance. Some work, however, has been done on the subject. Chapman & Casida (1937) applied the analysis of variance to all cycles and to cycles limited to a range of 4 to 33 days. They found no significantly inherent periodicity of cycles. However, when 17- to 27-day cycles were analysed, each animal had a very definite individuality in length. They stated that 41 per cent. of the observed variance would disappear if all the cycles were those of one individual. Asdell, Alba & Roberts (1949) found evidence that the individuality of the cow or heifer is the principal cause of variation in cycle length. Asdell (1952), in data from the U.S.D.A., Beltsville herd, gives a figure of 0·18 for the repeatability and 0·05 for the heritability of regularity of heats. Analysing the breeding records of the Kentucky Agricultural Experiment Station herd, Olds & Seath (1951) found a significantly greater variation between than within cows. Generally, it would seem that when all cycles are considered the tendency

of a cow to repeat similar intervals between heats is not very great, but when only " normal " cycles around 17 to 27 days are considered there is a tendency to repeat. The genetic part of this tendency, however, would not appear to be large.

Intensity of heat is of considerable importance, but little work has been done on it. Lagerlöf (1951), however, is of opinion that weak heat symptoms will be a great problem in certain breeds of cattle. He considers that Simmenthaler, Telemark and Swedish Highland cows have, as a rule, intense and pronounced heat symptoms, very easily recognised, even in an unfavourable environment. In Swedish Red Cattle, on the other hand, the heat is often so weak and so inconsiderable that in winter time in many herds it is detected with difficulty. In Sweden to-day he considers that weak heats are the most difficult problem of artificial insemination.

Other Genetic Aspects of Fertility

Inbreeding and Fertility.—The three main inbreeding experiments so far conducted in cattle are those at Beltsville, California and New Jersey.

At Beltsville, Woodward & Graves (1933) found that the inbreeding of Holsteins did not affect the readiness with which they conceived. However, in a later report, Woodward & Graves (1946) state that the average number of services per conception increased from 2·00 to 3·58 as the coefficient of inbreeding of the foetus rose from 0 to 50 per cent. Most of this effect, however, was due to the progeny of a particular bull. At New Jersey, Bartlett, Reece & Mixner (1939) report that all four foundation sires were satisfactory as regards fertility, when inbreeding was practised to them. However, when later the results were analysed on a cow family basis (Bartlett & Margolin, 1944), differences in conception rates in these families were noted. As has already been seen, the inbreeding in the California herd resulted in the production of sterile heifers.

In addition to these studies, there are reports by Fincher & Williams (1926) of arrested development of the Mullerian ducts, and by Hull, Dimock, Ely & Morrison (1940) of tubular genitalia, in females produced by inbreeding.

We may conclude, then, from these studies that inbreeding generally results in a reduced fertility, but the exact degree of this depends on the particular bull.

The Inheritance of Twinning.—There is a large literature on this subject and here it is intended to indicate only key references and conclusions. The most extensive paper is that of Johansson (1932). He summarised previous literature to show that overall twinning rates differed considerably in different breeds, varying from about 0·5 per cent. to about 9 per cent. He concluded from a study of three Swedish breeds that the percentage repetition after the first multiple birth was about 8, and after the second about 19. He concluded from the high frequency of twinning among one bull's daughters that in some cases at least, multiple births in cattle have a hereditary basis. But because a bull must produce a fairly large number of daughters, each with several calvings, before it can be decided that it transmits the tendency for multiple ovulation, very little can be done by means of selection to decrease the percentage of multiple births in a breed. He considers, however, that because of the high mortality of all twins, and the sterility of the freemartins, there is no reason to assume that the proportion of gene carriers in the breed as a whole will increase even if the breeders do not carry out any systematic selection against multiple birth.

Korkman (1948) obtained similar figures to Johansson on the repeatability of twinning and provided further evidence that daughters of different sires differed in their twinning rates. He also provided figures showing that some breeds did not differ in their identical twinning rates. Robertson (1950) considered that it might be comparatively easy to raise the twinning rate, but it would be difficult to reduce. The greatest effect would be obtained by progeny testing in large units.

Embryonic Mortality.—Stewart (1952) has provided evidence of the widespread nature of early embryonic mortality in Britain, and considers that it is the most important problem of bovine fertility at the present time. The cause of some of this may be genetic. However, as Casida (1950) states, the actual demonstration in cattle of causes of embryonic death, apart from ageing of the egg, is lacking almost entirely.

Laing (1952) is probably correct in thinking that environmental factors are more often responsible than genetic ones for embryonic mortality. Hammond's (1943) work on rabbits indicates that on occasions genetic factors, acting through the mother, may be involved.

Production and Fertility.—Little is known about either the phenotypic or genetic correlations between fertility and high production. We have already seen that Swedish hypoplasia is associated with more butter-fat, and cystic ovaries with a greater quantity of milk. In these cases, selection for high production would tend to spread sterility. On the other hand, Ward (1939) classified cows according to their butter-fat percentages, and found no evidence that the higher producers were more infertile as indicated by the percentage which calved at a desired time. Phillips (1949) found no evidence that higher yielding cows were more commonly discarded as infertile. Asdell (1952) gives an index which has been used to show that possibly there is a slight significant negative relationship between breeding efficiency and mean yield in Ayrshires, but none in Guernseys, Holsteins and Jerseys; the number of cows, however, was small in all breeds.

The Naturally High Prolificacy of the Dairy Breeds.—Finally, amidst all of our studies on " sterility " in dairy cattle, it is well to remember the enormous inherent prolificacy of dairy breeds. There have been several estimates of the potential rate of expansion of cattle. One of the most recent calculations is that of Robertson & Asker (1951), who estimate that the pedigree Friesian population has doubled itself in five years. In a recent study (Young, 1952) of the Dexter breed, it is shown that despite the death of 25 per cent. of the bulldog heifers and the ban on breeding from another 25 per cent. of Kerry type heifers, the breed can still continue and indeed expand slightly. Sterility, genetic or otherwise, is important because of delay in getting cows in calf, waste of food in rearing sterile animals, and for similar reasons. It must, however, be very severe indeed to cause reduction of a breed or herd owing to lack of replacements.

Summary

A survey has been made of the genetic aspect of fertility and infertility in dairy cows.

Variations in the fertility of their daughters due to sires would appear to be slight compared with the total variation in fertility. Less than 20 per cent. of the differences in fertility between cows would seem to be permanent, and only about half of these would appear to be genetic. Hence the rate of increase in fertility due to selection would be slow. In the present state of our knowledge it is impossible to say what genetic techniques would be best to increase

fertility. Positive selection for fertility is probably not worth while in dairy cattle.

Various genetic defects of the genitalia have been examined. The most extensively investigated case is that of hypoplasia in the Swedish Highland breed. There is evidence that infertility in heifers may be due to genes for sterility. Nymphomania, various sperm defects and other genetic causes of sterility are then considered. It is concluded that the spread of these conditions depends on the extent to which they are associated with good or supposedly good production qualities. Inbreeding frequently results in a decline of fertility. The heritability of dizygotic twinning is such that it could be selected for moderately easily, but this would not be desirable. There is not much evidence that genetic factors are greatly involved in early embryonic mortality. There is little evidence that high production induces infertility. Infertility would need to be very severe to cause a shortage of replacement in dairy cattle herds.

References

Anderson, J. (1945). The Semen of Animals and its Use for Artificial Insemination. Imp. Bur. Anim. Breed. & Gen., Edinburgh.

Asdell, S. A., de Alba, J., & Roberts, S. J. (1949). *Cornell Vet.* **39.** 389.

———. (1952). Report on the II International Congress of Physiology and Pathology of Animal Reproduction and of Artificial Insemination. Copenhagen. **2.** 7.

Bane, A. (1952). *K. Landtbr Akad. Handl. Stockh.* **91.** 132.

Bartlett, J. W., Reece, R. P., & Mixner, J. P. (1939). *Bull. N.Y. Agric. Exp. Sta.* No. 667.

——— & Margolin, S. (1944). *Ibid.* No. 712.

Berge, S. (1942). *Z. Tier. Zucht.* **52.** 127.

Blake, T. A. (1945). *Nature.* **155.** 631.

Blom, E., & Christensen, N. O. (1951). Royal Vet. & Agric. Coll. Year Book, 1951. Copenhagen.

Bonsma, J. C. (1940). *Fmg. S. Afr.* **15.** 373.

Casida, L. E. (1950). *Vlaam. diergeneesk. Tijdshr, 1950.* 273.

——— & Chapman, A. B. (1951). *J. Dairy Sci.* **34.** 1200.

Chance, C. M., & Mather, R. E. (1949). *J. Anim. Sci.* **8.** 603.

Chapman, A. B., & Casida, L. E. (1937). *J. Agric. Res.* **54.** 417.

De Groot, T., & Numons, S. R. (1946). *Tijdschr. diergeneesk.* **71.** 373. (*A.B.A.* **15.** 24).

Donald, H. P., & Hancock, J. L. (1952). Evidence of Gene Controlled Sterility in Bulls. In press. *J. Agric. Sci.*

Dunbar, R. S. J., & Henderson, C. R. (1950). *J. Dairy Sci.* **33.** 377.

Engelhardt, B. V. (1952). Report of II International Congress of Physiology and Pathology of Animal Reproduction and of Artificial Insemination. Copenhagen. **2.** 48.

Eriksson, K. (1943). Hereditary Forms of Sterility in Cattle. Ohlssons, Lund.

Fincher, M. G. (1946). Amer. Soc. Stud. Sterility Trans. 1–17.

——— & Williams, W. L. (1926). *Cornell. Vet.* **16.** 1.

Fohrman, M. H., & Graves, R. R. (1939). *U.S. Dept. Agr. Tech. Bull.* No. 677.

Garm, O. (1949). *Acta Endocrin.* Suppl. 3. Copenhagen.

Gilmore, L. O. (1949). *J. Dairy Sci.* **32.** 71.

Gregory, P. W., Mead, S. W., & Regan, W. M. (1945). *Genetic.* **30.** 506.

———, ———, ——— & Rollins, W. C. (1951). *J. Dairy Sci.* **34.** 1047.

Hancock, J. L. (1949). *Vet. Rec.* **61.** 308.

——— & Rollinson, D. H. L. (1949). *Ibid.* **61.** 742.

Hansson, A., & Bane, A. (1950). (Quoted in Lagerlöf, 1951).

Hignett, S. L. (1950). *Vet. Rec.* **62.** 652.

Hull, P. E., Dimock, W. W., Ely, F., & Morrison, H. R. (1940). *K. Agr. Exp. Sta. Bull.* No. 422.

Hutt, F. B. (1946). *Cornell. Vet.* **36.** 180.

Hammond, J. (1943). *Harper Adams Util. Poult. J.* **19.** 557.

Johansson, I. (1932). *Z. Zuchtung,* **B. 24.** 183.

Kab, E. (1937). *Diss. Univ. Munich.* (*abs.*) *A.B.A.* **6.** 200.

Koboz eff, N., Pomriaskinsky-Kobozieff, N. A., & Dupont, A. (1945). Génétique de Sterilité. *Rec. Med. Vét.* **119.** 49–58. (*A.B.A.* **13.** 69).

Korkman, N. (1947). *Maataloust Aikakausk.* **19.** 101. (English).

———. (1948). *Hereditas.* **34.** 23.

Lagerlöf, N. (1934). *Acta. Path. Microbiol. Scard.* **19.**

———. (1938). Proc. XIII International Veterinary Congress, Zurich.

———. (1939). Proc. V. Northern Vet. Congress, Copenhagen.

———. (1951). *Fertility & Sterility.* **2.** 230.

——— & Boyd, H. (1952). Report of II International Congress of Physiology and Pathology of Animal Reproduction and of Artificial Insemination. Copenhagen. **2.** 164.

——— & Settergren, J. (1952). *Ibid.* **2.** 153.

Laing, J. A. (1952). *Ibid.* **2.** 17.

Lasley, J. F., & Bogart, R. (1943). *M. Agric. Exp. Sta. Res. Bull.* No. 376.

Löwe, H. (1938). *Kühn-Arch.* **51** (2). 71.

McMeekan, C. P. (1952). *Brit. Agric. Bull.* **5.** 202.

Mead, S. W., Gregory, P. W., & Regan, W. M. (1946). *Genetics.* **31.** 475.

Milk Marketing Board. (1950a). Report No. 1 Production Div., Thames Ditton, Surrey.

———. (1950b). "Breeding is a Business." Production Division, Thames Ditton, Surrey.

Olds, D., Morrison, H. B., & Seath, D. M. (1949). *Ky. Agr. Exp. Sta. Bull.* **539.**

——— & Seath, D. M. (1950). *J. Dairy Sci.* **33.** 721.

——— & ———. (1951). *Ibid.* **34.** 626.

Olson, H. H., & Peterson, W. E. (1951). *Ibid.* **34.** 489.

Phillips, J. R. E. (1949). "Some Further Observations on Wastage and Replacement in Dairy Herds." Univ. Coll. Wales, Aberystwyth.

Rendel, J. M. (1952). *J. Genet.* **51.** 89.

Robertson, A. (1950). *Farming.* **4.** 335.

——— & Asker, A. A. (1951). *Emp. J. exp. Agric.* **19.** 191.

Seath, R., Staples, C. H., & Neasham, E. W. (1943). *Lousiana Exp. Sta. Bull.* No. 370.

Smith, G. F. (1951). *Proc. Brit. Soc. Anim. Prod.* 13 & 14 Meet., 1950. 25–33.

Spielman, A. A., & Jones, I. R. (1939). *J. Dairy Sci.* **22.** 329.

Spriggs, D. N. (1946). *Vet. Rec.* **58.** 405, 415.

Stewart, D. L. (1952). *Ibid.* **64.** 303.

Tabler, K. W., Tyler, W. J., & Heath, C. (1951). *J. Dairy Sci.* **34.** 95.

Taussig, S. (1946). *Int. Rev. Agric.* **37.** 256.

Trimberger, G. W., & Davies, H. P. (1945). *J. Dairy Sci.* **28.** 659.

Wagner, H. (1932). *Dtsch. tierärztl. Woschr.* **40.** 547.

Walton, A. (1950). Proc. Soc. Stud. Fertil. (Camb.), No. 1, Edin. Conf., 1949.

Ward, A. H. (1939). *Emp. J. exp. Agric.* **7.** 350.

Woodward, T. E., & Graves, R. R. (1933). *U.S. Dept. Agric. Tech. Bull.* **339.** 32 pp.

——— & ———. (1946). *Ibid.* **927.** 37 pp.

Yapp, W. W. (1947). *J. Dairy Sci.* **30.** 552 (abs.).

Young, G. B. (1952). In press. *J. Agric. Sci.*

DISCUSSION

Mr. A. F. Holt began by expressing appreciation of the paper which had been given and congratulating Dr. Young on the matter included and on the manner of its presentation. He had given them a most lucid and comprehensive account of the researches which had been carried out on the problem of infertility in so far as it was affected by heredity. As they were aware, a very large amount of work had been carried out on this subject by a great number of workers in various parts of the world and Dr. Young's paper had crystallised all that information in a most convenient form.

Almost every known type of non-infectious infertility had been dubbed "genetical" throughout the literature, though one had the feeling that in many cases symptoms rather than their causes were stressed overduly. Both Eriksson and Garm looked a little beyond the obvious and suggested that the real cause of the ovarian problems which they reported was the inheritance of deficient activity in the sex glands; in other words, this might be rather the inherited factor, the ovarian dysfunction being the patent symptom. This logically had a bearing on the condition but, on the other hand, could not be the whole story for Eriksson reported that of the cattle affected with ovarian hypoplasia in Sweden 82 per cent. had left side lesions only. One would have expected the condition to be bilateral if hormonal deficiency were the whole answer. So that at present they could say that two factors might each be inherited: hormonal dysfunction and ovarian abnormality or perhaps susceptibility.

The variability of sires' conception rate was of considerable importance to many of those present and the possibility of low fertility being inherited from the bull could have heavy repercussions in A.I. work where the use of one sire might be con-

siderable. Everyone would agree that C.R. varied with environment though it had been shown by several workers that bull infertility could be inherited and the real danger seemed to be the possibility of passing on by a bull recessive genes for low fertility, thus increasing the number of stock of potentially low fertility. This was a matter which did not of course stop at reduced fertility but could apply equally to obvious defects of genitalia such as white heifer disease and incomplete development of uterine horns.

In natural matings the spread of undesirable recessives was not a serious matter since in a strain or breed where one animal in, say, 10 carried a recessive bad character and where mating was random, only one animal in 400 would be homozygous for the recessive and show the defect thus:—

$$\text{Homozygote} \times \text{Homozygote} = \frac{9}{10} \times \frac{9}{10} = \frac{81}{100} = 81\%$$

$$\left.\begin{aligned} \text{Homozygote} \times \text{Heterozygote} &= \frac{9}{10} \times \frac{1}{10} = \frac{9}{100} \\ \text{Heterozygote} \times \text{Homozygote} &= \frac{1}{10} \times \frac{9}{10} = \frac{9}{100} \end{aligned}\right\} = 18\%$$

$$\text{Heterozygote} \times \text{Heterozygote} = \frac{1}{10} \times \frac{1}{10} = \frac{1}{100} = 1\%$$

Only the last mating could give a pure recessive and then only in one-quarter of progeny; this was a very small proportion of the herd or breed but was subject to considerable magnification if applied to an A.I. centre using one bull on a large number of cows when he carried a heterozygous recessive. If this were to happen, half his progeny resulting from mating with homozygous cows with no recessive would carry the recessive but not show it. In matings with heterozygous cows one-quarter of this progeny would carry no recessive at all, half would carry the recessive factor but behave normally and one-quarter would be homozygous for the recessive, *i.e.*, a phenotype of three to one but a genotype ratio of 1:2:1. This meant that the recessive gene would be more widely inseminated and if females carrying it were later mated to another bull also heterozygous of the factor, then again three of every four progeny would carry the factor, one of them in the pure state and thus infertile. Mr. Holt said he would like to ask Dr. Young what steps he considered A.I. centres could reasonably take to prevent this risk which could apply to any recessive character. Would test matings on to, say, 20 daughters of these bulls have any value in assessing the genetical purity of a sire? One was impressed, in this respect, with the figures on the Swedish work on ovarian hypoplasia where, by a slaughter policy and using bulls known not to carry the gene (a sex-linked one), the frequency of the condition had been reduced from 25·6 per cent. in 1935 to 7·9 per cent. in 1942.

With regard to inheritance of semen characteristics, Mr. Holt thought that it was probably true to say that this could occur; bulls of the South Devon breed, for instance, seemed to produce semen of singularly fine quality, counts of 2,000 to 3,000 million per c.c. being the general rule. He knew of no other breed which did this. On the other hand, his colleagues informed him that Shorthorns generally produced semen of rather low density, though he had no doubt of the highest fertility.

Service behaviour was obviously greatly conditioned by environment but inheritance could probably play a part. He recalled the case of an old bull at his centre whose service behaviour was almost identical with that of its son, who also was at the centre. In each case, if allowed to mount at once, the bull would ejaculate before erection of the penis. This was checked by restraint until erection was achieved. Even then, touching the prepuce at collection caused immediate ejaculation in each bull. It might be that factors giving rise to this spontaneous ejaculation were inherited. In another case, a young bull at the centre was incapable of service, being unable to achieve a proper erection. Instead, a partial erection was followed by a series of rapid extrusions and withdrawals. Later, another bull was examined and showed identical behaviour; he was found to be a half-brother to the first bull. At the centre now another bull of the same family showed a tendency to these symptoms though as yet it had not prevented collection. Experience of this kind made one interested in the possibility of inheritance of sexual characters.

One could not, of course, assume that the simple explanation of a recessive gene behaving like Mendel's peas would cover the whole field of hereditary infertility and it was more than probable that in most cases, as in the inheritance of milk, the whole process was an additive one where several factors, some of them probably "linked," could vary fertility according to their interplay and degree of inheritance. Looking at the infertility problem of the country as a whole, however, it could be said that most of the infertility in dairy cattle was of a temporary nature and therefore was not inherited, so that it would appear that up to now, at any rate, they need not be too apprehensive over, though they must not ignore, the implications of Dr. Young's paper. In conclusion, Mr. Holt again congratulated the author on his fine treatise which obviously had involved a very great deal of work and which had collected many and varied researches in one whole, bringing the overall picture into perspective.

Professor N. J. Scorgie said that Dr. Young had presented a very balanced survey of the genetic aspects of reproductive efficiency, and his paper when published would provide a valuable reference source to workers in this and related fields of investigation.

Dr. Young had made it clear that inheritance played only a very minor part in the aetiology of bovine sterility. The recognition of this fact, Professor Scorgie thought, was very necessary at the present time because there was a growing tendency on the part of veterinarians to ascribe an unwarranted rôle to genetical factors in the causation of sterility when no observable or diagnosable reason could be found. Such a method of reasoning was, of course, bad logic, and Dr. Young had to-day shown quite unambiguously that "hereditary causes" could hardly ever be used as a "get out" when all else had failed to reveal the cause of sterility in any particular instance.

As a result of the excellent investigational studies carried out by Lagerlöf and Eriksson, who had shown that the gonadal hypoplasia in both sexes of the improved Swedish Highland breed of cattle was conditioned by a recessive autosomal gene with incomplete penetrance, there now seemed to be a widespread belief in this country that *any* sporadic case of testicular hypoplasia in the young bull was attributable to an hereditary cause. For example, the Ministry of Agriculture would refuse to license a bull with this defect, and possibly this attitude of caution was the right one when administering statutory regulations. They, as scientists, however, could not fail to recognise that as far as British breeds of cattle were concerned, there was no authentic data to support the Ministry's implied belief that testicular hypoplasia of the young bull was hereditary. The occurrence of hereditary gonadal hypoplasia in the Swedish Highland breed was an entity peculiar to that particular breed, and according to Eriksson (1946) the condition did not occur either in the Swedish red polled or the Norwegian polled Tronder breeds, nor indeed in any of the other Scandinavian breeds of cattle, all of which had at any rate a greater geographical affinity with the Swedish Highland breed than any of the British breeds of cattle.

There were two points on which Professor Scorgie found himself at variance with the speaker or with the work he had cited. The first was in connection with the conclusions of Mead *et al.* (1946), arrived at as a result of their analysis of the gene frequencies in two types of sterility in Jersey and Holstein heifers, *viz.*, "according to the available data, sterility in dairy heifers is common. Their data indicated that *most of it, if not all, is caused by heredity*. Possibly environmental factors may be responsible for the failure in some heifers to conceive. Such cases, however, are probably rare under a good regime of feeding and management, when there are no infectious diseases." The implication of the last sentence of the quotation in relation to what went before could not be grasped, but this apart, the authors would seem to pronounce *ex cathedra* that the major cause of sterility in dairy heifers was a genetical one. Few veterinarians, either here or in the U.S.A., who had investigated sterility in the field as distinct from statistical calculation in the laboratory, would, he imagined, agree with such a conclusion, and he was glad to note that Dr. Young, too, advised caution before its acceptance without confirmation by other workers.

The second point about which he was in doubt concerned the interpretation of Dr. Young's statement, "We may conclude, then, from these studies that inbreeding generally results in a reduced fertility, but the exact degree of this depends on the particular bull." The inbreeding to which he referred, Professor Scorgie assumed, was that in the three experimental investigations cited in his paper. Professor Scorgie thought that he was being less than fair in not mentioning the many instances of inbreeding within pedigree (commercial) herds which had led to no observable deterioration in reproductive efficiency. Professor Scorgie would also like to have his meaning in regard to "but the exact degree of this (reduced fertility) depends on the particular bull."

Professor Scorgie then went on to point out that some of the dairy cattle breed societies collected and published records of high lifetime production in individual animals. One of the prerequisites for such production was the ability to calve regularly, and therefore the selective registration of cows having high lifetime production might offer, in effect, a practicable means of selection for high reproductive efficiency.

Mr. K. O'Sullivan observed that although Dr. Young had confined his paper to the bovine, doubtless with very good reason, it would have been interesting if reference had been made to other animals, particularly horses, pigs and poultry. There must, he thought, be large volumes of material assembled on these animals and conditions arose which did not appertain to the bovine. One condition which arose in cattle, namely, oedematous calves in the Ayrshire breed, must, Mr. Sullivan maintained, be considered as a factor limiting fertility. Another condition was cryptorchidism, or "rig." In pigs scrotal hernia was an hereditary condition and the fertility of boars affected in that manner might be lessened.

Mr. A. D. J. Brennan referred to mention of the Swedish experience of testicular hypoplasia in cattle as a factor in the cause of inherited infertility or sterility and asked if Dr. Young could say if there was any record of similar work having been done in this country. Alternatively, did he consider that a similar condition in this country would lead to similar results?

Mr. I. G. Shaw drew attention to the fact that Dr. Young had not mentioned the anasarcous calves which were produced by some Ayrshires. Whether it was an intentional omission or not he did not know, but he would like Dr. Young to verify the fact that it was a recessive factor and, if possible, tell them more about it.

Mr. G. H. Arthur said that when investigating an animal breeding problem it was customary to consider both hereditary and environmental aspects. With regard to infertility in the cow, it was not agreed that this was for the most part of a temporary nature due to functional abnormalities of the reproductive system. There was general satisfaction when it could be related to environmental influences which could often be corrected but he thought that this might be a too facile approach to the problem and that heredity might play a complementary part, even in the simpler types of infertility. Mr. Arthur suggested that owing to their genetical make-up, certain cows had relatively labile endocrine constitutions which were easily upset by environmental stresses and that there was perhaps too great an inclination to belittle the genetical aspects of the bovine infertility problem.

Mr. J. P. Frappell suggested that it was interesting to speculate whether any genetically inherited sterility of bovine females existed in this country, which was not altogether apparent because farmers disposed of maiden heifers that could not be got in calf by two or three services, grading them barren. In one of the American reports quoted by Dr. Young, a figure of 10 per cent. was given in respect of maiden heifers that were considered as unable to breed. With the current high level prices that were obtainable for maiden heifers sold for slaughter, a large number of commercial dairy farmers were not greatly concerned if each year they had to dispose of a proportion of maiden heifers that were brought in for breeding, and it was evident, in many cases, that these animals had been classified as barreners, even though they had received only two or three services and had had no veterinary examination.

Inherited sterility factors in such animals could not, of course, be perpetuated as they produced no stock, with the result that the proportion disposed of annually remained more or less static. Continuous occurrence of the condition arose through production of progeny from sires and dams carrying the particular factor as a recessive and, therefore, themselves not sterile.

The Reply

Dr. Young thanked the openers of the discussion for the points they had brought forward, and for their very kind remarks on his paper. Mr. Holt had asked him what steps A.I. centres could take to reduce the risk of spreading recessive lethals, and if test mating 20 daughters of bulls would be of value. Such test matings would spot the great majority of carriers, but it was doubtful if the trouble involved would be justified for the majority of bulls. Where, however, a progeny testing scheme was being operated from an A.I. centre, it would probably be desirable to mate bulls to their daughters for their first lactations, and thus test them. Where, however, there was no such scheme and a lethal was circulating in a breed, probably a careful screening of pedigrees was all that was necessary. In such breeds the affected strains usually became known quite rapidly, but it would be desirable in Britain to have some system similar to the methods used in Finland, whereby a list of possibly affected animals could be published without fear of law actions against its authors. At the present moment, however, to progeny test all bulls for lethals would be a complicated procedure.

More generally, however, it could be said that the spread of lethals through A.I. was a danger which could be over-emphasised. Lethals could spread rapidly through a breed where A.I. was not used. Breed structure was such that a few leading herds dominated the rest. When lethals got into such herds, they were widely disseminated through their association with the good or supposedly good characters of the animals in these herds. A.I. probably did more to eliminate lethals than to spread them, since it focused attention on them. Moreover, whilst A.I. could spread lethals rapidly, it could eliminate their appearance equally as rapidly by using non-carrier bulls. For those who were interested in the spread of lethals through breeds, the best British paper was a recent one by Donald *et al.* in *The Veterinary Journal*, dealing with dropsical calves in Ayrshires.

Dr. Young was glad that Professor Scorgie had emphasised both that there was no authentic data that testicular hypoplasia was hereditary in British breeds, and that at the present moment, caution should be exercised in accepting that sterility in heifers was chiefly of hereditary origin. He was doubtful, however, whether there had been as much inbreeding in pedigree (commercial) herds as Professor Scorgie suggested. There had been a certain amount of line breeding, and possibly some of this had been accompanied by decline in reproductive efficiency, but the evidence was not sufficiently accurate to be of great value. With regard to the meaning of "but the exact degree of this (reduced fertility) depends on the particular bull" he was merely stating that inbreeding to some bulls would produce more infertility than to others.

Mr. O'Sullivan had drawn attention to the comparative aspects of infertility, and it could be said that in other animals, and especially the pig, on which an enormous amount of research had been done, the picture was similar to that of cattle, the environmental components of fertility generally being much greater than the genetical ones. Mr. Brennan had asked if a similar condition to Swedish hypoplasia occurred in this country. There were references to a similar condition here, but it would not be wise to conclude that the condition was identical to Swedish hypoplasia, and in particular that it was inherited. Mr. Shaw had asked about anasarcous calves in Ayrshires. There could be little doubt that the condition was caused by an autosomal recessive, but because of peculiarities in the sex ratio, the case was not absolutely proved.

Mr. Arthur had suggested there was danger of belittling the genetical aspects of fertility. This was a possible danger and more work was really required. At the present moment, however, the evidence was that environmental factors were of much greater significance than genetical ones. Mr. Frappell had very wisely drawn attention to some of the difficulties involved in measuring infertility in the field.

Finally, Dr. Young expressed his pleasure at spending an afternoon in the company of those members of the profession who were engaged in following out the newer sciences of animal production.

Hereford Herd Book Society have told the Minister of Agriculture, Sir Thomas Dugdale, that they view with the gravest alarm the implications of the Oaksey Report on the export and import of cattle semen. The Society are of the opinion that there are insufficient safeguards for the well-being of their own and similar breeds; that if the Oaksey recommendations were adopted a considerable loss of export revenue to the country would occur, and that a deterioration of pedigree cattle, particularly beef cattle, would be inevitable.

* * * * *

A Private Member's Bill providing for the humane slaughter of pigs at places other than licensed slaughterhouses has been given a unanimous Second Reading in the Commons. Brigadier R. Rayner, moving the Second Reading, said that some 500,000 pigs slaughtered each year outside slaughterhouses did not come under the protection of the Slaughter of Animals Act, 1933. Under the Bill a pig owner, if he did not decide to employ an expert to slaughter the pig, only had to borrow a humane killer and get a licence under Section 4 of the Firearms Act.

BLOOD SAMPLING LARGE NUMBERS OF CATTLE

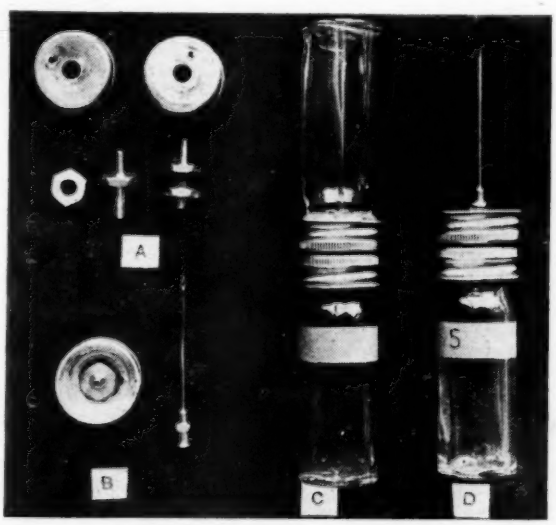
BY

N. H. HOLE,

Ministry of Agriculture, Weybridge

In the course of carrying out Field Trials of some experimental work we have had occasion to take blood samples from complete herds of cattle. Our methods and equipment have provoked some comment, and several practitioners have requested me to publish a short note on the subject for ready reference.

The equipment we use is quite simple, and consists of a " bleeding unit " for each animal. This unit was devised to meet the requirements of speed of operation, to avoid the complications of cleaning needles and syringes on the farm, and we must admit, to impress owners that the maximum precautions are taken to ensure that the needles pushed into their animals are sterile and cannot cause or transmit an infection. In addition, the chances of mislabelling samples are reduced to a minimum. The unit is made up of two McCartney bottles fastened cap to cap by a special nipple made to our design by the Medical Supply Association. The needle end will take any " Record " type needle, and the complete unit is assembled and autoclaved at the laboratory and stored ready for use. The top bottle is used solely as a guard to the needle and as a means of preserving sterility until it is removed as the subject is approached. The bottom bottle bears a numbered label, serves as a handle for inserting the needle, and receives the blood. After bleeding, the guard bottle is replaced, and on return to the laboratory the top section, comprising the two screw caps, the nipple, needle and guard bottle, are removed for cleaning and reassembling, and are replaced on the blood sample by a normal screw cap. The photograph illustrates the component parts, the complete unit, and the unit ready for immediate action. This piece of apparatus was not designed to send through the post; if this is necessary the bottom bottle should be removed and sealed by a screw cap.



A.—The specially prepared screw caps and nipple.
B.—Screw caps assembled ready for needle.
C.—Unit ready for sterilisation.
D.—Ready for immediate action.

On first sight this may appear to be a rather cumbersome piece of apparatus for a simple venepuncture, but with the experience of bleeding several thousand animals behind us we would not use any other method. It was devised to suit our method of blood sampling, and we will therefore outline briefly the technique we have adopted. We always take the blood from the jugular vein. The animal is held with the head turned away from the operator, horizontally at an angle of about 30°; the ease with which the vein is picked up depends entirely on the correct position of the head, and if this is twisted it is very often difficult to find the vein. We do not use a bleeding cord except on adult bulls; digital pressure on the vein below the site of insertion is all that is needed, and if the size of the animal permits we prefer to pass the left arm over the neck and to press the fingers on the vein from below, this not only being easier but also helping to immobilise the neck. The needle is pushed firmly, not stabbed, straight into the vein about 5 inches below the angle of the jaw. Some animals are much more skin sensitive than others, and in such cases a slight gimlet action seems to reduce reaction to a minimum. To give some idea of the speed that can be attained by this method, I personally have taken 5 c.c. of blood from 43 cattle including two adult bulls in 53 minutes, but the conditions in this case were ideal and the animals were Jerseys. As a contrast a herd of 60 Aberdeen Angus which did not handle well took nearly three hours. Adult bulls need a bleeding cord, and for them we have found the best way is for the head to be held straight but high, usually by passing the chain on the nose ring over the top bar of the bull yard. This seems to act as an additional restraint, because we have sampled a lot of reputedly " difficult " bulls without trouble by this method, although invariably we have an additional rope or chain passed over the horns as a precaution. We dislike taking samples with the animals in crushes, stocks, or yokes; there is no easier way to get broken knuckles. The great majority of our patients are dairy cattle used to being handled, but the wilder the animal the greater the need for freedom of movement for the operator, and I would rather tackle the craziest beast, for blood sampling, securely snubbed to a post in a yard than in a crush where the bars get in the way with every movement of the head. In my limited experience Channel Island cattle are the easiest, Ayrshires the most treacherous, and Aberdeen Angus among the most difficult because of their very short fleshy neck and great strength, but I do not doubt that with wider experience in some parts of Britain I might come to consider the last named as lambs. We have never yet resorted to bulldogs because I consider them unnecessarily cruel, but very occasionally with a particularly difficult animal we have used a piece of fine rope covered with rubber tubing looped round the lower jaw under the tongue in the interdigital space, to control the head. It is a curious thing that some animals will fight madly when " nosed " but stand perfectly still when restrained in this manner.

Weekly Wisdom

The widespread use of new drugs before possible side-effects have been studied is a frightening feature of modern medicine.—" British Medical Journal."

CLINICAL COMMUNICATION

EQUINE DERMATOMYCOSIS IN KENYA CAUSED BY *MICROSPORUM GYPSEUM*

P. W. THOROLD,

Veterinary Research Laboratory, Kabete, Kenya

A skin disease of horses characterised by papillomatous and raised scab-like lesions varying in size from a few mm. to 1 to 2 cm. in diameter occurs in certain parts of Kenya, particularly in those areas where the average yearly rainfall is 30 inches or more.

The condition has been recognised for many years in Kenya, where it is known as " Uasin Gishu skin disease " (the Uasin Gishu plateau is a European farming area where the disease is fairly prevalent). At one time it was thought to be caused by a species of Sporotrichum (Annual Report, Kenya, 1934); no evidence, however, was presented in support of this and the lesions certainly do not resemble equine sporotrichosis (Robinson & Parkins, 1929; Thorold, 1951). A certain amount of confusion exists to-day as the term " Uasin Gishu skin disease " is used by farmers to describe any skin condition of unidentified aetiology, as well as conditions such as ringworm (*M. equi*), streptothricosis (*S. congolense*) and mange. The disease caused by *M. gypseum*, however, can be identified by the type of lesion produced, the presence of mycelial elements in the scab, the absence of the typical sheath of arthrospores around the hair, and isolation of the causal organism from the scabs.

During 1951 two horses were presented for examination, both suffering from " Uasin Gishu skin disease ":—

Case I. *Subject.*—Grey Mare

The animal was literally covered with hard, dry, powdery scab-like lesions varying from 2 to 10 mm. in diameter and raised 3 to 5 mm. above the skin surface, consisting of epithelial cells, hair and detritus. In old lesions the scabs were easily detachable, leaving a pock-mark with new skin. Developing lesions, however, appeared papillomatous, were raised 3 to 4 mm. above the skin and bled easily on scraping. Lesions on the muzzle and round the eyes were small, 2 to 3 mm. in diameter and closely adjacent. Scabs protected on the inside of the ears were up to 2 cm. in length. On the medial aspect of the thighs and below the hocks and knees lesions were almost confluent. Over the neck, chest, belly, shoulders, back, flanks and quarters lesions were 2 to 4 cm. apart. On the soft skin of the belly and thighs were a number of crateriform lesions 3 to 4 cm. in diameter filled with yellowish-white powdery material. The disease did not appear to cause any irritation and the animal was in fair condition.

Case II. *Subject.*—Bay Gelding

The lesions were similar to those seen in the subject of Case No. 1, but comparatively few in number. Their distribution was general. This animal was slaughtered and material obtained for histopathological examination.

Scab material from both these cases was examined by the usual methods for dermatomycoses, scabs and hairs treated and cleared with NaOH or KOH and preparations with lacto-phenol cotton blue. In none of these preparations examined under low power could any ectoparasites be found nor the typical diagnostic feature of hairs surrounded by sheaths of spores. However, numerous clumps of segmented hyphae and arthrospores were noted lying free between cells and tissue debris. Material was then crushed and teased out with a few drops of water on a slide, fixed by heat, and stained with Loeffler's methylene blue. Microscopical examination now revealed numerous branching, segmented, mycelial elements from 3 to 20 μ in length and 2 to 4 μ in diameter, with numbers of arthrospores 3 to 6 μ in diameter. Material was seeded on to Sabouraud's dextrose agar with 0·0005 per cent. copper sulphate (Thorold, 1949). After standing at room temperature for three to four days, white fluffy colonies appeared, 1 to 2 mm. in diameter, consisting of a branching mycelium bearing numbers of macroconidia typical of the genus *Microsporum*.

Pure cultures were obtained, seeded in liquid Sabouraud's medium, and used for transmission tests on two Somali-type ponies. On each pony two areas 10 cm. in diameter, one behind the withers and the other on the quarters, were scarified slightly and then saturated with the culture. On one pony the areas were damped daily with water for 15 days. (This method had been used successfully in the transmission of *Actinomyces dermatonomus* (Thorold, 1950)). Both animals developed typical lesions, from which the organism was again recovered, 19 and 27 days respectively following inoculation. These lesions were self limiting.

A culture was then submitted to Dr. H. I. Lurie, Mycologist at the South African Institute for Medical Research, Johannesburg, who identified it as *M. gypseum*.

In the present work material from five animals has been examined and in each instance the lesions have been similar and *M. gypseum* has been isolated.

Material from two animals was available for histopathological examination. Sections were stained with the periodic acid Schiff stain as modified by Kligman & Mescon (1950), which shows up the fungal elements in purple against a green background.

Pockets of mycelial elements and arthrospores were found in hair follicles and sebaceous glands with extension into the Malpighian and granulous layers. There was marked proliferation of the Malpighian layer. The pockets of fungal elements appeared to be pushed to the surface with subsequent sloughing of the whole lesion. There was no evidence of invasion of the *cutis vera*, round cell infiltration or exudate.

Treatment.—None of the following fungicides: $CuSO_4$, $KMnO_4$, Terprol (May & Baker), Tineafax (Burroughs Wellcome), phenyl mercuric acetate, effected a complete cure of two animals treated, although the condition was markedly alleviated.

Due to the position of the organism in hair follicles and sebaceous glands, the presence of scabs and, in particular, papillomata, penetration of the fungicide is rendered difficult. It would seem that a more effective method of applying the fungicide would be by intravenous inoculation. This method is now being investigated.

Acknowledgments.—I wish to thank Dr. H. S. Purchase, formerly of these laboratories, for drawing my attention to this condition, and the Director of Veterinary Services, Kenya, for permission to publish.

References

Ann. Rept. of Dept. Agric., Kenya, **3**, 26. 1934.
Kligman, A. M. & Mescon, H. (1950). *J. Bact.* **60**, 415.
Robinson, E. M., & Parkins, B. S. (1929). *J. S. Afr. vet. med. Ass.* **1**, 17.
Thorold, P. W. (1951). *Ibid.* **22**, 81.
———. (1949). *Ibid.* **20**, 89.
———. (1950). *Ibid.* **21**, 30.

NEW INSTRUMENTS AND APPLIANCES

AN AURISCOPE FOR CANINE USE

R. K. ARCHER, M.A., M.R.C.V.S.,
Equine Research Station,
Animal Health Trust

The primary use of this auriscope is to examine the external auditory meatus, to facilitate the removal of foreign bodies from it. It has one main advantage over the standard auriscope in that there is a clear space for the manipulation of instruments between the light source and examining lens on the one hand and the speculum on the other.

The handle of the instrument is a standard battery handle containing two "leak proof" dry cells. By means of a bayonet catch the auriscope head is fitted to it and a special bulb has its filament accurately aligned with a lens projecting a beam of light from the top of the short tube which projects from the top of the handle. (See figure.) Immediately at the top of this tube there is a viewing lens mounted on a bearing permitting the lens to be moved sideways. This bearing is provided with a variable tension device and the lens itself is mounted in a threaded tube to allow adjustment of focus.

A short, strong bar connects the base of the auriscope's main tube with the ring holding the speculum. The space between this ring and the viewing lens is therefore free for the manipulation of instruments, such as crocodile forceps, within the meatus but under continual observation. The ring holding the speculum can be replaced by other rings of differing depth, so permitting of deeper penetration in the meatus of larger dogs.

Speculae of anodised brass (*i.e.*, black) and of chromed brass have been used and there seems very little to choose between them. A set is used with three speculae of overall length 1¾ inches and with oval nozzles of 1/10, 1/5 and 3/10 inches maximum diameter respectively and a set of two speculae of 2¼ inches length and nozzles of 1/5 and 3/10 maximum diameters. These five speculae between them will permit of the examination of the meatus of any canine subject.

The illustration shows the 2¼ by 3/10 inch speculum in place.

It is possible, by this auriscope, to examine the greater part of the external auditory meatus in sufficient detail to enable the presence of foreign bodies, ulcerations or lesions of the cartilage and lining skin to be determined readily. By its use a better prognosis is possible, and any manipulation with instruments within the meatus is rendered more expeditious than with other standard auriscopes in use in canine clinical work. For example, for the removal of "grass seeds" from the dog's meatus this instrument has proved extremely useful. It is possible to identify the presence of awns and to watch the jaws of the crocodile forceps picking them up and only to attempt removal when a firm grip is seen to have been achieved. It has been found that removal of these awns has often been possible without general anaesthesia in cases that would certainly have necessitated it with other types of auriscope.

The instrument can be used as a vaginoscope, but its performance in this respect would be improved with the use of different speculae from those described here. It may be possible for it to be used as a laryngoscope, and even as a cystoscope, with suitable speculae.

The auriscope and some of the speculae used were made by Messrs. C. Davis Keeler Ltd., 39, Wigmore Street, London, W.1. The remainder of the speculae were made for me by a local garage.

My thanks are due to Professor Miller, Director of this Station, for advice and help in the preparation of this note for publication.

RESEARCH STUDENTSHIPS IN ZOOLOGY

The Zoological Society of London is offering a limited number, not exceeding six, of research studentships to senior undergraduates reading zoology, tenable during the summer vacation for a minimum period of four weeks at the Society's Gardens, Regent's Park, or at Whipsnade Park, where laboratory and other facilities are provided. Work which includes observations on living animals will be given preference; experiments requiring a subsistence allowance for those living away from home may be awarded. Applications, giving particulars of the applicant's age and attainments and a brief outline of the work proposed, and supported by the head of the department in which he or she works, should be sent before April 30th to the Director, Zoological Society of London, Regent's Park, London, N.W.1.

* * * * *

The Director of the South African Onderstepoort Veterinary Research Laboratory, Dr. R. V. Alexander, has been asked to visit the United States to assist the Federal Bureau of Animal Husbandry to form an organisation to fight the spread of "blue tongue" disease.

* * * * *

The 1953 Register of Accredited Poultry Breeding Stations and Accredited Hatcheries in England and Wales, with details of their stock, has been published, and may be obtained, post free, on application to the Poultry Branch of the Ministry of Agriculture and Fisheries at 3, Whitehall Place, London, S.W.1.

REVIEW

[***The British Journal of Animal Behaviour.*** (Vol. 1, No. 1.) Published quarterly by The Association for the Study of Animal Behaviour and Baillière, Tindall & Cox, Ltd., 8, Henrietta Street, W.C.2. Annual subscription 27s. 6d., U.S.A. and Canada $5.00]

The first number of this new journal has appeared and contains articles dealing with the behaviour of bees, wild rabbits, wild rats, domestic ruminants and man. This selection of articles is a pointer to what this new journal is likely to aim at, namely, to further the knowledge of the behaviour of wild animals in their natural setting and of domestic animals in the man-made setting and to compare such behaviour with that of man. The Editors hope to extend the usefulness of the journal by publishing reviews and letters.

To the veterinarian it is the contribution which a study of animal behaviour may make to an improvement in livestock husbandry which will be of most interest. Dr. Thorpe, in an editorial, stresses that "Workers in animal husbandry, and veterinary science particularly, have opportunities not only to make advances of great practical utility in the development of the scientific basis on which their industries stand, but also, in so doing, to make important contributions to pure science itself." The veterinary profession has already shown an interest in the grazing behaviour of the domestic herbivores on manured and unmanured old pasture and new leys. It is unlikely, however, that a full contribution will be made to the science of animal behaviour until the veterinary student is given instruction in the principles involved and the terms used therein.

Being still a comparatively young science, some terms used by its exponents may lack as yet a universally accepted definition; this need is exemplified in this number in a discussion on the use of the term "Mimesis."

The appointment as Editors (along with collaborators) of Messrs. A. N. Worden and B. A. Cross will ensure that new developments in animal behaviour of importance to the veterinarian will be given due prominence in this journal.

INTERNATIONAL HORSE TRIALS AT BADMINTON

Major Rook Wins Three-Day Event

The Queen with the Duke of Edinburgh and Princess Margaret honoured the Badminton trials with their presence during the second half of last week, when they and an enormous attendance of visitors had the gratification of witnessing a British triumph.

Major Lawrence Rook, Royal Horse Guards, reserve member of the British team, riding Mrs. Baker's Starlight, won the individual championship with the remarkable score of plus 5·3. The British team, consisting of Mr. Hindley on Speculation, Mr. Hill on Bambi and Major Weldon on Kilbarry, won the team event, of which they were the sole survivors on the concluding day, the Swiss and Irish having been eliminated on the previous day. Her Majesty presented the trophies.

* * * * *

Hannover Veterinary School.—The incorporation is announced, by order of the Minister of Education, of the Ambulatory Clinic and Clinic of Forensic Medicine in the Veterinary School of Hannover. Herr Professor Dr. Hupka, Professor of Medicine and Forensic Medicine, has been appointed Director of the joint clinic.

ABSTRACTS

Neomycin in the Treatment of Mastitis*

Whilst it has already been shown that neomycin is effective against many common gram-negative and gram-positive organisms, no information was available regarding the concentration at which this antibiotic was effective. This is the problem with which this paper deals.

Tests were carried out *in vitro* with cultures of *Str. agalactiae, Str. dysgalactiae, Staphylococcus aureus, Escherichia coli, Str. uberis* and *P. aeruginosa*, and normal healthy udders were infused with 0·25 to 5 gramme amounts of the preparation in 10 to 20 ml. of water to see if there were any adverse effects, the milk being submitted to appropriate tests for this purpose. No ill effects were detected as a result of udder infusion.

In the table given showing the variation in susceptibility according to the organism, *Str. agalactiae* is shown as the most susceptible after 48 hours' exposure, and *P. aeruginosa* the least. The former required a concentration of up to 0·39 μg. of neomycin per ml.; the latter 1·25.

Twenty-four of 29 cases of streptococcal mastitis treated on two successive days with 0·25 gramme responded to treatment. Two hundred and twenty-seven infected quarters were given an initial infusion of 0·5 gramme and 177 were negative 10 days later. Eight out of 14 cases of Pseudomonas infection responded to treatment. When given intramuscularly there was a demonstrable blood level for at least eight hours.

When aqueous solutions were given the agent remained in the udder for at least 72 hours, and it was equally effective when employed in a water miscible base.

[Unfortunately, the results were judged on microscopic and not on cultural evidence.—*Abstractor.*]

N. S. B.

* **Evaluation of Neomycin Sulphate in the Treatment of Bovine Mastitis.** Drury, A. R. (1952). *Vet. Med.* **47.** 407–411.

* * * * *

Microscopic Diagnosis of Liver Fluke*

The authors describe a modification of the technique of Swanson, L. E., & Hopper, H. H. (1950. *J.A.V.M.A.*, **112**, 127), which reduces the time and equipment required and avoids any injurious effects upon the fluke eggs of the solution of aluminium sulphate used. The technique is as follows:—

1. Place 500 grammes of cattle faeces, taken from the rectum, in a 1,000 ml. beaker and mix it thoroughly.

2. Remove 5 grammes of this, taking small amounts from various parts of the faeces, to a 250 ml. Erlenmayer flask with 100 ml. water, and shake until a uniform suspension is obtained.

3. Wash this suspension through a series of wire screens (20, 40 and 60 squares to the linear inch) into a 1,000 ml. beaker and then transfer the suspension to a 1,000 ml. graduated glass cylinder.

4. Add 1 ml. of 1 per cent. solution of aluminium sulphate and stir thoroughly. Allow the mixture to settle for 10 to 15 minutes. Siphon off the supernatant fluid to about ¾ inch from the bottom, without disturbing the sediment containing the fluke eggs. This may be done with a U-tube connected to a vacuum filter pump.

* **An Improved Technique for the Microscopic Diagnosis of Liver Fluke Infection in Cattle.** Rivera-Anaya, J. D., & Martinez, J. (1952). *J. Amer. vet. med. Ass.* **120.** 203–204.

5. Add 1 ml. standard tincture of iodine (7 per cent.) to the sediment, mix and allow to stand for two minutes. The iodine stains the fluke eggs a deep brown.

6. Centrifuge the sediment as it is for two minutes at about 2,000 r.p.m. Pour off all the supernatant fluid except about 1 ml.

7. Mix up the remaining sediment and examine it on a slide.

G. L.

* * * * *

An Encephalitic Strain of Hog Cholera Virus*

Evidence has accumulated to show that in the U.S.A. losses from swine fever in vaccinated herds were due to a variant strain of virus against which immune serum was not easily prepared owing to the virus's instability in serial animal passage during serum production. The authors investigated an atypical strain of virus in regard to its distinctive properties and the means of maintaining them in serial passage. The primary characteristic of the disease was convulsive seizures, lasting from one minute to two hours, observed between the third and 11th day following the inoculation of variant virus. Death commonly occurred two or three days after the onset of nervous symptoms which by then were often subsiding. In about 10 per cent. of pigs nervous symptoms took the form of chorea rather than convulsive seizures. The occurrence of nervous symptoms was maintained equally in subcutaneously and intracranially inoculated pigs (16 passages.) The variant strain appeared to be more virulent than standard strains. Thus variant virus produced a temperature above 105° in 50 per cent. of pigs in about one and a half days as against three and a half days with the standard strains of virus; leucopenia also developed more quickly. All unimmunised pigs (100) infected with it died. Doses of immune serum sufficient to neutralise standard strains were insufficient for the variant. Four pigs vaccinated with virus and serum were exposed to the variant virus two months later (one by contact, three by subcutaneous inoculation). All became ill with fever, leucopenia and diarrhoea as prominent symptoms. Pathologically the variant virus produced a disease of endothelial tissues characterised by hydropic degeneration, endothelial proliferation, perivascular cuffing and haemorrhages. In general, the lesions were marked and typical of acute swine fever uncomplicated by secondary bacterial infections. Lesions of the thalamus were present in all cases studied, most markedly in animals dying between the 10th and 14th days, whereas an ordinary strain of virus produced almost no lesions of the brain.

A. W. G.

* **A Study of an Encephalitic Strain of Hog Cholera Virus.** Dunne, H. W., Smith, E. M., Runnells, R. A., Stafseth, H. J., & Thorp, F. (1952). *Amer. J. vet. Res.* **13.** 277–289. (27 refs.)

MILK SAMPLING FOR BUTTER-FAT: TEST CASE SUGGESTED

A suggestion that the N.F.U. should fight a test case on the sampling of milk for butter-fat content has been passed to headquarters by the Shropshire N.F.U. branch. At the branch meeting (states the *Farmers' Weekly*) concern was expressed at the number of prosecutions against milk producers where the fat content in one particular churn was less than the minimum required by law. It was agreed that the union should seek acceptance of the principle that the average fat content of the consignment should alone form the basis of any action. The trouble, it was suggested, lay in the administration of the law rather than in the law itself.

QUESTIONS IN PARLIAMENT

Swine Fever: Minister's Strong Recommendation of the Use of Crystal Violet Vaccine"

Mr. Hurd (April 23rd) asked the Minister of Agriculture the extent of the present epidemic of swine fever; what measures are being taken to combat this; and, particularly, whether he advises immunisation with crystal violet vaccine.

Sir T. Dugdale: There have been 880 outbreaks of swine fever since January 1st, 1953. Of these outbreaks, 534 have occurred in three areas in East Anglia, Yorkshire and the West Midlands, including Warwickshire. The remainder have been fairly widely distributed over England and Wales, and there have been three in Scotland.

I have made an Order which comes into operation on April 27th declaring the three worst-affected areas to be swine fever infected areas. The main effect of this Order is to prohibit the holding of store markets for pigs in the areas. It also controls the movement of pigs into, within, and out of the areas. I strongly recommend the use of crystal violet vaccine, but it must be used before pigs become infected or have had contact with infection. The vaccine does not give complete protection until after a period of 10 to 14 days, and if used on infected animals may even have harmful results.

Mr. Johnson: Is the Minister fully aware of the anxiety of Midlands farmers, who hope that he will tackle this disease in the same way as he tackled foot-and-mouth disease last year?

Sir T. Dugdale: Yes, Sir, but not by the same policy. We hope, by the Order I have just made, that improvements will result. Experience suggests that an infected area Order leads very soon to an improvement.

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Tuberculin-tested Milk

Mr. Hollis (April 23rd) asked the Minister of Agriculture the policy of Her Majesty's Government in regard to the supply of tuberculin-tested milk.

Sir T. Dugdale: Under the Milk (Special Designation) (Raw Milk) Regulations, 1949, applications received after September 30th, 1954, for the issue and renewal of licences to use the designation "Tuberculin-Tested" will only be approved in respect of attested herds. The success of the Attested Herds Scheme has made it possible to add this more stringent test to the present requirements of animal health and hygiene in the dairy.

Mr. Hollis: Is my right hon. Friend aware that when farmers go T.T. there are some health officers who take them off the list of distributors of milk to schools? Can anything be done about that? Is he further aware that if we approach the Ministry of Health about this we are referred to the Ministry of Education, and if we go to the Ministry of Education we are referred to the Ministry of Health, and that I am trying my right hon. Friend out on the principle of the three-card trick?

Sir T. Dugdale: The mere fact that my hon. Friend has raised this Question in the House will bring it more closely to my attention than before. The scheme is going extremely well and we are getting more and more absolutely clean milk in the country.

Mr. J. Johnson: Is it not a fact that farmers with T.T. herds are losing money because of Government policy, and feel that they are not getting a square deal because the Government are placing more emphasis upon beef farming than upon the production of milk?

Sir T. Dugdale: That is a wider question, but I cannot agree with the hon. Gentleman that farmers who go in for T.T. milk are losing money. They are getting benefit out of the scheme.

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Gin Traps

Dr. Stross (April 23rd) asked the Minister of Agriculture when he proposes to take action to forbid the use of gin traps.

Sir T. Dugdale: This would require legislation. Before I can consider this question further I must await the experience of county agricultural executive committees, who are now using humane traps under everyday working conditions.

Dr. Stross: Will not the Minister show himself more sensitive to the experience of constituents who write to us so frequently condemning the barbarity of this type of trap, particularly in view of its mutilating effect on their domestic pets? Cannot we have something better?

Sir T. Dugdale: I am entirely sympathetic towards this problem, but it would be misleading if I said that I thought we had the answer until I am certain we have it. We now have these

new traps in commercial use by the county committees—they have only just got there owing to manufacturing difficulties—and after a time we shall receive reports as to how effective they are, and then we will see whether we can make any progress.

NOTES AND NEWS

Diary of Events

May 5th.—Meeting of the Midland Counties Division, B.V.A., at Stafford (The Swan Hotel), 2. 30 p.m.

May 7th.—Annual General Meeting of the Central Division, B.V.A., at the Royal Veterinary College, N.W.1, 6 p.m.

May 13th.—Meeting of the Editorial Executive, B.V.A., 2.30 p.m.

May 13th.—Annual General Meeting of the South-East Midlands Division, B.V.A., at Northampton (Franklins Gardens Hotel), 7.15 p.m.

May 14th.—Laboratory Animals Bureau Symposium (on "Laboratory Animals") at the Royal Society of Medicine.

May 16th.—Meeting of the Biochemical Society, in the Department of Physiology, The Medical School, Hospitals Centre, Birmingham, 15, 1.45 p.m.

May 19th.—Meeting of the East Midlands Division, B.V.A., at Sutton Bonington (School of Agriculture), 2.15 p.m.

May 20th.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at 1, Wimpole Street, W.1, 5 p.m.

R.C.V.S. Engagements in Edinburgh

May 27th to 29th, 1953, R.C.V.S. Committee and Council Meetings: Quarterly Meeting of Council, May 29th; preceded by Special Meeting of Council. At the Royal (Dick) School of Veterinary Studies, Edinburgh, 9.

May 27th.—Annual General Meeting of the R.C.V.S., 4 p.m., to be held at the Royal (Dick) School of Veterinary Studies, Edinburgh, 9.
R.C.V.S. Dinner in Edinburgh, 7 p.m.

May 27th.—Annual General Meeting of the Victoria Veterinary Benevolent Fund, 4.30 p.m., to be held at the Royal (Dick) School of Veterinary Studies, Edinburgh, 9.

June 12th.—Annual Dinner of the R.A.V.C. Officers' Club, at Grosvenor House, London.

June 18th.—Summer Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Wellcome Research Laboratories, Langley Court, Beckenham, Kent, 2 p.m.

Aug. 9th—15th.—XVth International Veterinary Congress, Stockholm, Sweden.

Sept. 6th and 12th.—Seventy-first Annual General Meeting and Congress of the British Veterinary Association, at Aberdeen.

R.C.V.S. Examinations

Wednesday, May 6th.—Animal Management Examination commences at London.
Thursday, May 7th.—Entries for D.V.S.M. Examination due.
Friday, May 8th.—Pharmacology, etc., Examination (Revised Syllabus)—Written Examination.
Monday, May 11th.—Pharmacology, etc. (Revised Syllabus), Orals and Practicals (London and Dublin).
Thursday, June 4th.—D.V.S.M. Written Examination commences at Edinburgh (2 p.m.).
Monday, June 8th.—D.V.S.M. Orals and Practicals.
Thursday, June 25th.—M.R.C.V.S. Written Examinations.
Friday, June 26th.—Ditto.

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HOTEL ACCOMMODATION FOR THE CONGRESS PERIOD IN ABERDEEN

Members are informed that there is now no single room accommodation at the larger hotels in Aberdeen and it is suggested that some members might care to pair up for double room accommodation since this is still available.

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R.C.V.S. Dinner in Edinburgh

The annual general meeting of the Royal College of Veterinary Surgeons at 4 p.m. on Wednesday, May 27th, at the Royal (Dick) School of Veterinary Studies, University of Edinburgh, will be followed by a dinner for all members of the Royal College of Veterinary Surgeons and their ladies at the North British Hotel, Edinburgh. This will be at 7 p.m. for 7.30 p.m. (evening dress). The cost will be £1 per person, inclusive of coffee but not of drinks. Applications for tickets, together with remittance, should be made to:—

The Registrar,
R.C.V.S.,
9, Red Lion Square,
W.C.1,

who will supply any other information which may be required.

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PERSONAL

William Shipleys: In Practice to the Fifth Generation

It has been pointed out to us that the graduation, from the Royal Veterinary College in July of last year, of William Shipley, represented the entry into our profession of the fifth generation of that renowned East Anglian family of practising veterinary surgeons; moreover, for good measure, we have a continuity of both names, "Christian" and "Sur." Of course, the question has been posed, "Is this a record?" Invariably being "caught out" over any attempt to reply to this type of enquiry—and generally in the very next issue—we leave it to others to support or refute the claim, in the making of which, it should be stated, the family is not concerned.

Whatever the outcome, it is interesting to note that William Shipley, who was born on March 9th, 1799, and who graduated May 15th, 1823, at the Royal Veterinary College, was one of the foundation members of the R.C.V.S. in 1844. He died on March 9th, 1877. He was succeeded by his son, William Shipley, also of North Walsham, who graduated at the Royal Veterinary College, London, on April 30th, 1856, and died on June 28th, 1904.

The original William Shipley's grandson, also William, graduated at the Royal Veterinary College, London, on April 11th, 1888, and subsequently obtained the Fellowship of the Royal College and served as Councillor from 1901 to 1917, when he died on January 23rd. He was a Vice-President of the Royal College in the years 1906, 1910 and 1916.

The fourth generation of the family, also William Shipley, graduated at the Royal Veterinary College, London, on July 7th, 1915, and died June 26th, 1945. He was the third generation of the family to practise in Great Yarmouth and, we believe, was responsible for that popular feature of far-sighted benevolence, the institution of the now famous Eastern Counties Bowls Tournament for the "Shipley" Cup, the proceeds of which go to the Y.V.B.F. It is good to know that the tradition of this fine old veterinary family is being maintained.

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Birth.—MacAllister.—On April 17th, 1953, to Fay (*née* McWilliam), wife of Donald I. MacAllister, Broadstone, Stranraer, a daughter.

Bryson.—On April 5th, 1953, to Honor, wife of Robert W. Bryson, M.R.C.V.S., of Bulawayo, Southern Rhodesia, a son, Michael Andrew.

Evans.—On April 22nd, 1953, to Ann, wife of Stephen Evans, B.V.Sc., M.R.C.V.S., 4, Napier Gardens, Cardigan, a daughter, Hilary Shân.

Smith.—On April 22nd, 1953, at Reading, to Barbara (*née* Schofield), wife of Anthony C. Smith, of Home Farm, Lodge, Sulhamstead, Berks, a son, David Howard.

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Marriage.—Polley—Raishbrook.—On April 11th, 1953, at St. John's Church, Shirley, Croydon, Maurice Polley, M.R.C.V.S., youngest son of Mr. and Mrs. J. S. Polley, of Shirley, Croydon, to Kathleen, only daughter of Mr. and Mrs. H. Raishbrook, of Shirley, Croydon.

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Mr. T. Robson's Scottish Grand National Success.—It is of interest to note that the rider of the winner (Queen's Taste) of the Scottish Grand National at Bogside, on Saturday, April 18th, was a veterinary surgeon—Mr. Thomas W. Robson, M.R.C.V.S., of Carlisle.

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Holiday Home or Exchange.—Dr. Schmidbauer, Veterinary Surgeon, Taufkirchen/Pram, Upper Austria, would like to hear from any member of the profession in the British Isles who would be prepared to offer a home during the summer holidays to his 16-year-old student daughter, anxious to perfect her English. Willing to help in the house. Parents ready to offer similar facilities to English girl.

Captain Vincent Boyle and Dr. Brause.—In its issue of March 19th *The Montevidean* reports that Captain Vincent Boyle, C.M.G., M.R.C.V.S., Superintending Veterinary Officer of the British Ministry of Agriculture, and his Liaison Officer, Dr. Teodoro Pilz, were received by Councillor Dr. Luis Alberto Brause, who was very interested in the observations regarding the livestock industry Captain Boyle had made during his recent tour through Uruguay. "Dr. L. A. Brause also discussed veterinary affairs with Captain Boyle and emphasised his high personal regard for this distinguished visitor."

[Like Switzerland, Uruguay is governed by a council of nine members. Dr. Luis Alberto Brause is one of these, while he is also a member of a committee which decides all matters relating to agriculture and livestock.—*Editor.*]

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Opening of Birkbeck College

Queen Elizabeth, the Queen Mother officially opened the new buildings of Birkbeck College in Malet Street, London, on Tuesday last. The opening ceremony was carried out in the Beveridge Hall at the Senate House before a crowded and distinguished audience. It was preceded by three academic processions consisting of the academic staff, the Governors, and the Royal procession. The last included, in addition to the Queen Mother, the President, Vice-President, Chairman, Deputy Chairman (Dr. Wooldridge) and the Master, all of whom had previously been presented to Her Majesty in the Vice-Chancellor's room.

After the ceremony the processions passed in reversed order from the University to the adjoining new buildings of Birkbeck College where the Queen Mother unveiled a Commemorative Tablet. She then inspected the new laboratories and lecture rooms and had tea with the President and a few others in the Council room.

As intimated above, Dr. W. R. Wooldridge is Deputy Chairman of the Governors, and Mrs. W. R. Wooldridge was presented to Her Majesty just before tea.

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R.C.V.S. OBITUARY

McDonald, George, M.R.C.V.S., c/o Cambridge Veterinary Club, Box 5, Cambridge, New Zealand. Graduated Edinburgh, December 17th, 1932. Died March 2nd, 1953.

Thornton, Francis Johnstone, M.R.C.V.S., 16, South Street, Dorchester, Dorset. Graduated London, December 14th, 1894. Died April 14th, 1953; aged 80 years.

. . . . .

Mr. F. J. Thornton, M.R.C.V.S.

Mr. Francis J. Thornton, whose death we record above with much regret, was a well-known and much respected Dorchester and Weymouth veterinary surgeon, having lived in Dorchester since 1894.

Born at Ashwell, Suffolk, after graduation he became a partner in the practice of Mr. A. G. Barrow, of Dorchester. For health reasons, Mr. Barrow retired after a year of the partnership and Mr. Thornton assumed the practice entirely, and also a practice at Weymouth.

For many years veterinary inspector to the boroughs of Dorchester, Weymouth and Portland, Mr. Thornton also held a special panel appointment with the Ministry of Agriculture and Fisheries, and was one of the country's few Ministry referees. He maintained his keen interest in his profession right up to his death.

It was Mr. Thornton's proud boast (says the *Dorset Daily Echo*) that he had never missed a show of Dorchester Agricultural Society, of which he was the veterinary surgeon. In this position he was latterly joined by his younger son, Mr. Paul William Dillon Thornton, M.R.C.V.S., who has been in practice in Dorchester for many years.

Mr. Thornton was senior member of Dorchester Lodge of Freemasons, and was for a considerable period Vice-Chairman of the Committee of the Congregational Church in the town.

He is survived by his widow and two sons.

Mr. and Mrs. Thornton celebrated their golden wedding in August, 1948.

The funeral took place on Friday, April 24th, a service at the Congregational Church preceding interment at the Weymouth Road Cemetery. The British Veterinary Association was represented at the funeral service by Mr. L. St. Bel Golledge, M.R.C.V.S., of Sherborne.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax:

Kirkcudbrightshire.—Culvennan Farm, Castle Douglas (Apr. 17).

Lanarks.—Strutherhead Farm, Strathaven (Apr. 22nd).

Lancs.—Flash Green Farm, Wheelton, near Chorley (Apr. 17); Field on Elswick Side of Thistleton Brook, Elswick Road, Thistleton, Preston; Gift Hall Farm, Winmarleigh, Preston (Apr. 21).

Norfolk.—Hall Farm, Babingley, Castle Rising, King's Lynn (Apr. 17).

Salop.—Slades Farm, Hen Parks, West Felton, Oswestry (Apr. 20); Ashwood Farm, Ash, Whitchurch (Apr. 22).

Staffs.—Cairney Croft, Draycott Road, Forsbrook, Blythe Bridge, Stoke-on-Trent (Apr. 17).

Foot-and-Mouth Disease:

Middlesex.—Hawthorn Farm, Church Road, Northolt (Apr. 24).

Fowl Pest:

Berks.—Petts Patch, Harmanswater, Bracknell (Apr. 17); West Hendred Allotments, Wantage (Apr. 21).

Herefords.—Bury Farm, Wigmore, Leominster (Apr. 20).

Hunts.—Virginia House, Earith Road, Colne (Apr. 17); New Farm, Colne (April 20); Vineyard House, Colne, Huntingdon (Apr. 23).

Lancs.—Gisburn, Inskip, Preston (Apr. 19).

Middlesex.—Calcutts, Stanwell Moor, Staines; 376, Staines Road, Bedfont (Apr. 21).

Norfolk.—Rookery Villa, Thruxton, Norwich (Apr. 19).

Surrey.—Inholm, Glen Road, Beacon Hill, Hindhead (Apr. 19); Warren Farm, White Lane, Ash Green, Aldershot (Apr. 21).

Swine Fever:

Aberdeenshire.—South Howes, Skelmuir, Stuartsfield, Mintlaw Station, Aberdeen (Apr. 21).

Angus.—Whitewalls Farm, Tealing by Dundee (Apr. 24).

Berks.—St. Leonards Farm, St. Leonards Hill, Windsor (Apr. 24).

Cambs.—Beech House, Waterbeech (Apr. 21); 81, Swaynes Lane, Comberton (Apr. 22).

Ches.—The Fields, Lower Peover, Knutsford (Apr. 21); Cotton Hall, Cotton Edmunds, Chester (Apr. 22); Fox Farm, Ashton, Chester (Apr. 23); The Piggery, Urban Road Allotments, Altrincham (Apr. 25).

Cornwall.—Cansford Farm, Marshgate, Camelford (Apr. 21); Carveane, Probis, Truro (Apr. 24).

Denbigh.—Tirionymal, Llantysilis, Llangollen (Apr. 22).

Essex.—Elmdale, Little Wigborough, Colchester; Hillcrest, Chapel Hill, Halstead (Apr. 21); "Woodlands," Weeley, Clacton-on-Sea (Apr. 22); 143, Newland Street, Wickham Bishops, Witham (Apr 23); Quay Farm, Beaumont, Clacton-on-Sea; Topfield Farm, Ashwell Hall, Finchingfield (Apr. 24).

Glos.—The Hill, Tirley, Gloucester; 219, Blacksworth Road, Bristol, 5 (Apr. 22); Piggeries, South Liberty Lane, Bristol, 3; 142, Clouds Hill Road, Bristol; The Brittons, Poplar Terrace, Kingswood, Bristol; Yew Tree Farm, Kington Thornbury, Bristol; Milford House, Wick, Bristol (Apr. 24); Bristol School of Nursing, Bishops Knoll, Stoke Park, Bristol, 9; 16a, Soundwell Road, Staple Hill, Fishponds, Bristol (Apr. 25).

Hereford.—Groomstool, Lea, Ross-on-Wye; The Piggery, North Road, Aerodrome, Shobdon, Leominster; Uphampton Farm, Shobdon, Leominster; South Farm, Thorpe-le-Street, Shipton-on-Thorpe (Apr. 21).

Isle of Ely.—Fir Close, Ely Road, Little Downham, Ely (Apr. 21).

Kent.—Bitchett Wood, Stone Street, Sevenoaks (Apr. 22); Portland Nurseries, Marden, Tonbridge (Apr. 23).

Lancs.—Ollerton Farm, Failsworth, Manchester; Cinderland Hall Farm, Littlemoss, Ashton-under-Lyne (Apr. 21); Waddicar Farm, Waddicar Lane, Melling, Maghull, Liverpool; Land Settlement Association Allotments, Longmoor Lane, Kirby (Apr. 25).

Leics.—Desford Road Piggeries, Lubbersthorpe, (Apr. 21).

Lincs.—High Street, Wainfleet, Skegness (Apr. 21).

Lothian.—Elm Cottage, Birdsmill, Broxburn (Apr. 23).

Norfolk.—Moss's Allotments, Marsh Road, Great Yarmouth (Apr. 21); Grey's Farm, Saham Hill, Watton, Thetford; Irstead Hall, Neatishead, Norfolk (Apr. 22); Allotments, Dickleborough, Diss, Church Farm, Ashill, Thetford; Marshland and Meadowland, Gunton Lane, Costessey, Norwich (Apr. 24); Piggeries, Hewitt's Lane, Wymondham (Apr. 25).

Notts.—Knapthorpe Manor Farm, Caunton, Newark (Apr. 24); Bye-pass Piggeries, Radcliffe on Trent (Apr. 25).

Salop.—Coed-y-tye, Hindford, Whittington, Oswestry (Apr. 21); The Willows Farm, Halfway House, Shrewsbury; Moss Farm, Myddle, Shrewsbury (Apr. 23); Upper Farm, Woolstaston, Shrewsbury; Danford Farm, Claverley, Wolverhampton (Apr. 24); Lower Huntington Farm, Little Wenlock; Big Vron Farm, Weston Rhyn, Nr. Oswestry (Apr. 25).

Somerset.—Easton Farm, Easton, Wells; Cribbs Farm, Redhill, Wrington, Bristol (Apr. 24); Tower Hill, Beckington, Bath (Apr. 25).

Staffs.—9, Cannock Road, Chose Terrace, Walsall (Apr. 21); 63, Hednesford Road, Pye Green, Hednesford (Apr. 22); 4, Birches Barn Road, Wolverhampton (Apr. 23); Peel Street Piggeries, Tipton; Warren House Farm, Barracks Lane, Brownhills, Walsall (Apr. 23).

Suffolk.—Lion's Orchard, London Road, Beccles; The Street, Kettelburgh, Woodbridge; Popular Farm, Thurston, Bury St. Edmunds (Apr. 22); Hall Farm, Theberton, Leiston; Hall Farm, Stratford St. Andrew, Saxmundham (Apr. 23); Pear Tree Farm, Shotley, Ipswich (Apr. 24); Hoods Buildings, Brampton, Beccles (Apr. 25).

Surrey.—Langley Vale Farm, Epsom (Apr. 23); Stronde Farm, Virginia Water (Apr. 24).

Sussex.—Horsham Road Poultry Farm, and Broad Bourne, Horsham Road, Steyning (Apr. 21).

Warwicks.—Coldbath Farm, 333, Yardley Wood Road, Birmingham, 13; Hall Farm, Maxstoke, Coleshill, Birmingham; Samson Farm, Newbury Lane, Oldbury, Birmingham (Apr. 22); 11, Church Lane, Coventry (Apr. 23); Littlewood Green Farm, Studley (Apr. 24); Fairview Farm, Bulls Lane, Wishaw, Birmingham (Apr. 25).

Worcs.—Varty Cottage, Peopleton, Nr. Pershore; Mount Farm, Childs Wickham, Broadway (Apr. 25).

Yorks.—The Post Office, Skerne, Driffield; The Post Office, Fridaythorpe, Malton; Back Lane, Dunnington (Apr. 21); Highbury Farm, Duggleby, Malton (Apr. 22); Burnby House, Burnby, near Hayton, York; Bethany Farm, Linthwaite, Huddersfield; New Holland Farm, Weel, Beverley (Apr. 23); 3, Todd's Yard, Rothwell, Leeds (Apr. 24); Rossington Grange, Rossington (Apr. 25).

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HARRY STEELE-BODGER MEMORIAL FUND

The subscription lists to the above fund closed on April 30th, but in the case of organisations and societies meeting after that date the Hon. Treasurer will be pleased to accept donations later.

A list of future contributions received will be published in *The Veterinary Record* on May 9th.

All such donations should be sent to

S. L. Hignett,
Steele-Bodger Memorial Fund,
British Veterinary Association,
36, Gordon Square,
London, W.C.1.

Cheques, etc., should be made payable to the "Steele-Bodger Memorial Fund."

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

CONTROL OF "STREET DOGS"

Sir,—While agreeing that too many dog-owners are very careless in allowing their dogs to roam at large, nevertheless, it is difficult to believe that the letter under the above heading published in your issue of April 18th, could have been written by any one hoping some day to become a member of the veterinary profession.

The writer does not attempt to define what is "a street" nor how it could be differentiated from a road or other public place, but goes on to recommend that any dog "found in the street unless it is on a leash and accompanied by the owner"—note he uses the word "and" and not "or" and apparently would not even allow "a person in charge" other than the owner to lead out a dog—should be impounded by the police and destroyed if not claimed within 24 hours. He does not state, nor has he as yet issued his orders to the police—who are already over-worked and understaffed—how they "should take possession of" these dogs, but one might suggest that if a little salt were put on their tails, the dogs would meekly allow themselves to be led away and enticed to their doom should their owners not turn up within 24 hours.

Further comment is useless, though much more might be said though it would only be a waste of your valuable space, but I would add that if such views are the considered opinion of the present-day veterinary student, which I certainly cannot bring myself to believe, the outlook for the future of our profession is indeed a sorry one.—Yours faithfully, D. S. Rabagliati, Edinburgh. *April 20th*, 1953.

BEZOAR

Sir,—I read with great interest Colonel Noel Hudson's article on Bezoar. (*Vet. Rec.* **65.** No. 11, March 14th, 1953.)

In view of the widespread belief in the efficacy of this concretion until comparatively recent times, it is only fair to recall the observations of one unbeliever.

Ambroise Paré (1510 to 1590), surgeon to King Charles IX of France, in an age when medicine was ruled by superstition and the teaching of Galen, demonstrated by reason and experiment the uselessness of bezoar in the treatment of poison.

He recalls that the King asked him if there was any such thing as a universal antidote—to which he replied that as all poisons were different there could be no universal antidote and suggests that it could easily be proved by trying it out on a condemned criminal. He continues—"The motion pleased the King; there was a cook brought by the jailor who was to have been hanged within a while after for stealing two silver dishes out of his master's house. Yet the King desired first to know of him, whether he would take the poison on this condition, that if the antidote which was predicted to have singular power against all manner of poisons, which should be presently given him after the poison, should free him from death, that then he should have his life saved. The cook answered cheerfully, that he was willing to undergo the hazard, yea and greater matters, not only for to save his life, but to shun the infamy of the death he was like to be adjudged to. Therefore he then had poison given him by the Apothecary that then waited, and presently after the poison, some of the bezoar brought from Spain, which be taken down, within a while after he began to vomit, and to avoid much by stool with grievous torments, and to cry out that his inward parts were burnt with fire. Wherefore, being thirsty, and desiring water, they gave it to him; an hour after, with the good leave of the jailor, I was admitted to him; I find him on the ground going like a beast upon hands and feet, with his tongue thrust forth of his mouth, his eyes fiery, vomiting, with store of cold sweats, and lastly, the blood flowing forth by his ears, nose, mouth, fundament and yard, I gave him eight ounces of oil to drink, but it did him no good, for it came too late. Wherefore, at length he died with great torment and exclamation, the seventh hour from the time that he took the poison being scarcely passed. I opened his body in the presence of the jailor and four others, and I found the bottom of his stomach black and dry, as if it had been burnt with a cautery; whereby I understood he had sublimate given him; whose force the Spanish bezoar could not repress, wherefore the King commanded to burn it."—Yours faithfully, N. R. Turnbull, 65, Worting Road, Basingstoke, Hants. *April 27th*, 1953.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Sheep Scab	Swine Fever
16th to 31st March, 1953	44	1	12	—	177
Corresponding period in—1952	22	27	10	—	69
1951	20	—	11	—	34
1950	22	3	16	—	1
1st January to 31st March, 1953 ...	294	22	183	—	563
Corresponding period in—1952	119	56	65	1	275
1951	146	17	439	4	210
1950	126	12	52	18	1

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at March 31st, 1953, was as follows:—

England	Wales	Scotland	Total (Great Britain)
48,687	27,141	24,332	100,160